

Amor A. Menezes

Curriculum Vitæ

University of California, Berkeley
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EDUCATION

- Postdoc. **University of California, Berkeley**
2015 *Bioengineering, Synthetic Biology and Biological Control Systems*; Advisor: **Adam P. Arkin**
- University of California, San Francisco**
General Surgery, Systems Biology and Biological Modeling; Advisor: **Mitchell J. Cohen**
- Postdoc. **University of Michigan, Ann Arbor**
2011 *Aerospace Engineering, Modeling and System Identification*; Advisor: **Ilya V. Kolmanovsky**
- Ph.D. **University of Michigan, Ann Arbor**
2010 *Aerospace Engineering, Stochastic Optimization and Evolutionary Computation*; Advisor: **Pierre T. Kabamba**
- M.S.E. **University of Michigan, Ann Arbor**
2006 *Aerospace Engineering, Flight Dynamics and Controls*
- B.A.Sc. **University of Waterloo**
2005 *Mechanical Engineering, Options in Mechatronics and Management Sciences*; Advisor: **Jan P. Huissoon**

FLIGHT TRAINING

- Glider **Central Region Gliding School**
2005, 1999 *Transport Canada Glider Instructor*, Glider Licensed since 1999, Glider Instructor since 2005
- Single Eng. **National Flyers Academy**
2000 *Transport Canada Private Pilot's License with Night Rating*

HONORS, AWARDS AND SCHOLARSHIPS

- 2015 **Fellow**, Emerging Leaders in Biosecurity Initiative
- 2015 **Fellow**, Synthetic Biology Leadership Excellence Accelerator Program
- 2014 Conference Travel Award, Synthetic Biology Engineering Research Center Student and Postdoc Association
- 2011 **Policy Leader (top 50/1200)**, Public Service of Canada
- 2010 Conference Travel Award, American Control Conference
- 2010, 2007 Best Paper in Session, American Control Conference
- 2010 – 2008 **Natural Sciences and Engineering Research Council of Canada Post-Graduate Scholarship**
- 2009 Michigan Teaching Fellow (an awarded title), University of Michigan
- 2008 Best Paper in Session, ASME Dynamic Systems and Control Conference
- 2008 – 2006 International Conference Travel Awards, University of Michigan Rackham Graduate School
- 2007 – 2004 Canadian Space Agency Sponsored Student Delegate to the International Astronautical Congress
- 2005 – 2006 **Milo E. Oliphant Fellowship**, University of Michigan
- 2005 **Dean's Honors List (top 10%); Distinction; Sandford Fleming Co-op Medal**, University of Waterloo
- 2005 Ontario Engineering Competition, University of Waterloo Team A
- 2004 First Place, University of Waterloo Mini-Sumo Robot Competition
- 2004 – 2000 **Arthur F. Church Mechanical Engineering Academic Scholarship; Toronto Transportation Club Scholarship; Queen Elizabeth II Aiming for the Top Scholarship**
- 2003 **Husky Injection Molding Systems Co-op and Academic Scholarship**, University of Waterloo
- 2003 – 2001 Sir Sandford Fleming Outstanding Co-op Work Term Report Awards, University of Waterloo
- 2002 Sir Sandford Fleming Technical Speaking Faculty of Engineering Champion, University of Waterloo
- 2000 **Governor General's Medal; Ed King Outstanding Graduate of the Year**; Grace McFarlane Christian Outreach Award; University of Toronto National Book Award
- 1997 **Ontario Champion**, Spelling Bee of Canada

Bold denotes a major award

PROFESSIONAL EXPERIENCE

- 2010 – 2001 **Royal Canadian Air Force: Lieutenant, Cadet Instructor Cadre**
Central Ontario Gliding Centre, Canadian Forces Base Borden
- 2004 **Systems Designer, Research and Development**
ATS Automation Tooling Systems, Inc.
- 2003 **Stress Engineering Analyst**
Messier-Dowty, Inc.
- 2003, 2002 **Mechanical Engineering Designer**
Husky Injection Molding Systems, Ltd.
- 2001 **NASA Shuttle Remote Manipulator System Product Assurance**
MacDonald Dettwiler Space and Advanced Robotics, Ltd.
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TEACHING AND MENTORING

- AE 551 **Co-Primary (Half-Semester) Instructor**
2011 *Nonlinear Systems and Control*, University of Michigan, Ann Arbor
Graduate Course, 40 students, Winter semester
- 2010 **Graduate Teacher Certificate**
Center for Research on Learning and Teaching, University of Michigan, Ann Arbor
Primary instructor certified by completing training beyond the graduate student instructor level
- 2010 – 2007 **Graduate Student Instructor (GSI) Mentor**
College of Engineering, University of Michigan, Ann Arbor
Center for Research on Learning and Teaching, consultant for 30 GSIs every semester
- AE 245 **Graduate Student Instructor**
2009 – 2006 *Performance of Aircraft and Spacecraft*, University of Michigan, Ann Arbor
Undergraduate Course, 150 students every Fall semester, 35 students every Winter semester
Average Student Evaluation: 4.2/5.0; Average Student Evaluation of Previous Course Instructors: 3.8/5.0;
Average Student Evaluation of Instructors in the College of Engineering: 4.0/5.0
- 2009, 2007, **High School Gifted Student Mentor**
2006 *Michigan Mentorship Program*, Washtenaw County Alliance for Gifted Education
Aerospace Engineering, 1 student every summer
- 2005 **Glider Flight Instructor**
Royal Canadian Air Cadets Glider Scholarship Program, Central Region Gliding School
3 students
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SERVICE AND LEADERSHIP

- 2012, 2011 **Co-chair: American Control Conference**
Regular Session, “Flight Control II” and “Biologically-Inspired Methods and Applications”
- 2011 **Member: Outstanding Student Instruction Award Selection Committee**
College of Engineering, University of Michigan, Ann Arbor
- 2011 **Guest Editor: Robotica**
January *Cambridge Journals*, Special Issue on “Robotic Self-X Systems”
- 2010 – 2009 **Executive Member: Graduate Student Advisory Council**
Aerospace Engineering, University of Michigan, Ann Arbor
- 2009 – 2008 **Organizer: Flight Dynamics and Control Seminar Series**
Aerospace Engineering, University of Michigan, Ann Arbor
- 2009, 2008 **Organizer: Graduate Student Instructor Orientation**
Aerospace Engineering, University of Michigan, Ann Arbor
- 2008 **Organizer: 2008 ASME Dynamic Systems and Control Conference**
Invited Session, “Self-Reconfigurable and Self-Reproducing Dynamic Systems”
- 2005, 2003 **Residence Don and Frosh Leader**
St. Paul’s United College, University of Waterloo
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RESEARCH INTERESTS

Synth. Bio.	Design, simulation and validation of generalized biological control and signal processing modules Applications of synthetic biology in space, to reduce mission costs without compromising safety or success
Sys. Bio.	Development of tailored clinical treatment options for patients with trauma-induced bleeding and clotting
Optimiz.	Advancement and deployment of a biologically inspired, on-line, model-independent, search-based optimization technique that achieves global optimization in dynamic environments efficiently and resiliently
Decision	Optimal management of glider flight in random lift environments for both transport and pursuit
Control	Extensions of control-theoretic methods to ensure robust performance of novel biological and physical systems

RESEARCH SUPERVISION

2015	Daniel A. Anderson, University of California, Berkeley, Bioengineering, B.S.; Topic: Genetic control systems
2011	Dhaval D. Shah, University of Michigan Aerospace Eng., M.S.E.; Topic: Glider flight environment modeling

RESEARCH FUNDING SECURED

2014	Synthetic Biology Engineering Research Center, National Science Foundation <i>Design and Validation of a Synthetic Genetic Reference Tracking Controller</i> , 1 year of postdoctoral funding
2013	Aligned Research Program, NASA and the University of California, Santa Cruz <i>Analysis of Synthetic Biology Techniques for Resource Utilization and Food Production in Space</i> , \$40,000
2009	National Science Foundation <i>GOALI: Control of Cyclic Systems: Theory, Applications, and Experiments</i> , \$299,998
2008	National Sciences and Engineering Research Council of Canada <i>Self-Reproducing Systems: Theory and Application</i> , 2 years of partial Ph.D. funding

RESEARCH REVIEWER

Journal	Computational and Mathematical Methods in Medicine, IEEE Robotics and Automation Magazine, Journal of Mathematical Biology, Mathematical Problems in Engineering: Theory, Methods, and Applications, PLoS Computational Biology, PLoS One, Robotica
Conference	American Control Conference, ASME Dynamic Systems and Control Conference, IEEE Conference on Decision and Control, IFAC World Congress

INVITED TALKS (EXCLUDING CONFERENCE PAPER PRESENTATIONS)

Total: 14

1. *Targeted Clinical Control of Trauma Patient Coagulation Through a Thrombin Dynamics Model*. Postdoc Seminar Series. California Institute for Quantitative Biosciences, University of California, Berkeley, February 13, 2015.
2. *Towards Synthetic Biological Approaches to Resource Utilization on Space Missions*. Synthetic Biology Super-group, California Institute for Quantitative Biosciences – Berkeley; Synthetic Biology Engineering Research Center; and the Synthetic Biology Institute, University of California, Berkeley, January 21, 2015.
3. *The Utility of Biological CO₂-Based Manufacturing on Manned Space Missions*. Weekend Workshop on CO₂-Based Manufacturing, NASA Ames Research Center, Mountain View, June 28, 2014.
4. *A Thrombin Dynamics Model of Trauma Patient Coagulation for Targeted Clinical Control*. Center for Systems & Synthetic Biology, University of California, San Francisco, San Francisco, May 24, 2013.
5. *Efficient, Model-Independent and Responsive Stochastic Optimization for Robot Learning*. Mobility and Robotic Systems Section, NASA Jet Propulsion Laboratory, Pasadena, July 25, 2012.
6. *Causal Inference in Modeling Coagulation Activation in Trauma*. Causal Consulting Seminar Series. Biostatistics, Public Health, University of California, Berkeley, April 24, 2012.
7. *Efficient and Responsive Stochastic Optimization*. Control Systems, United Technologies Research Center, East Hartford, August 9, 2011.

8. *Efficient and Responsive Stochastic Optimization for Machine Learning*. Machine Learning / Control Systems, Philips Research North America, Briarcliff Manor, August 2, 2011.
9. *Efficient and Responsive Biologically-Inspired Stochastic Optimization*. Bioengineering, University of California, Berkeley, June 28, 2011.
10. *Efficient and Responsive Systems for Stochastic Optimization*. Electrical Engineering, University of Washington, Seattle, February 11, 2011.
11. *Efficient and Responsive Behavior Design by Selective Evolutionary Generation*. Control Seminar Series. College of Engineering, University of Michigan, Ann Arbor, September 24, 2010.
12. *Evolutionary Generation Systems Theory for Resilient Opportunistic Global On-line Optimization*. Flight Dynamics and Control Seminar Series. Aerospace Engineering, University of Michigan, Ann Arbor, March 27, 2009.
13. *Aerospace Exploration: The Final Frontier for the Next Generation*. Soaring Success for High Achievers. Washtenaw County Alliance for Gifted Education, Ann Arbor Mallett Creek Library, March 27, 2007.
14. *Information Requirements for Self-Reproducing Systems in Lunar Robotic Colonies*. Flight Dynamics and Control Seminar Series. Aerospace Engineering, University of Michigan, Ann Arbor, November 3, 2006.

REFEREED PUBLICATIONS

Journal Papers Published or In Press

Total: 6

1. **Amor A. Menezes**, John Cumbers, John A. Hogan, and Adam P. Arkin. Towards synthetic biological approaches to resource utilization on space missions. *Journal of the Royal Society Interface*, 12(102):20140715, January 6 2015. **Cover article**.
2. **Amor A. Menezes** and Pierre T. Kabamba. Optimal search efficiency of Barker's algorithm with an exponential fitness function. *Optimization Letters*, 8(2):691–703, February 2014.
3. Chris Vermillion, **Amor Menezes**, and Ilya Kolmanovsky. Stable hierarchical model predictive control using an inner loop reference model and λ -contractive terminal sets. *Automatica*, 50(1):92–99, January 2014.
4. ‡Yongsoon Eun, Eric M. Gross, Pierre T. Kabamba, Semyon M. Meerkov, **Amor A. Menezes**, and Hamid R. Ossareh. Cyclic control: Problem formulation and stability analysis. *ASME Journal of Dynamic Systems, Measurement, and Control*, 135(5):051012–1–051012–9, September 2013.
5. ‡Yongsoon Eun, Eric M. Gross, Pierre T. Kabamba, Semyon M. Meerkov, **Amor A. Menezes**, and Hamid R. Ossareh. Cyclic control: Reference tracking and disturbance rejection. *IEEE Transactions on Control Systems Technology*, 21(3):753–764, May 2013.
6. **Amor A. Menezes** and Pierre T. Kabamba. Optimal seeding of self-reproducing systems. *Artificial Life*, 18(1):27–51, 2012.

‡ denotes an alphabetical author listing

Journal Papers In Revision or Under Review

Total: 3

1. Andrew T. Klesh and **Amor A. Menezes**. Guidance and control of hopping robots for small-body surface exploration. Submitted to the *AIAA Journal of Guidance, Control and Dynamics*.
2. **Amor A. Menezes** and Pierre T. Kabamba. Efficient and resilient micro air vehicle flapping wing gait evolution for hover and trajectory control. Submitted to the *AIAA Journal of Aerospace Information Systems*.
3. **Amor A. Menezes** and Pierre T. Kabamba. Efficient search and responsiveness trade-offs in a Markov chain model of evolution in dynamic environments. Submitted to the *Journal of Mathematical Biology*.

Journal Papers In Preparation

Total: 6

1. **Amor A. Menezes** and Pierre T. Kabamba. Bioinspired resilient grammatical inference for robot learning in dynamic environments. Expected submission to *Artificial Life*.

2. **Amor A. Menezes** and Ilya V. Kolmanovsky. On-line model-independent powertrain efficiency improvement in a series hybrid electric vehicle. Expected submission to the *IEEE Transactions on Control Systems Technology*.
3. **Amor A. Menezes**, Michael G. Montague, John A. Hogan, John Cumbers, and Adam P. Arkin. Grand challenges in space synthetic biology. Expected submission to *Current Opinion in Biotechnology*.
4. **Amor A. Menezes**, Vivek K. Mutalik, and Adam P. Arkin. Synthetic genetic reference tracking controllers. Expected submission to *PLoS Computational Biology*.
5. **Amor A. Menezes**, Dhaval D. Shah, and Ilya V. Kolmanovsky. Stochastic model-dependent and model-independent glider flight management. Expected submission to the *IEEE Transactions on Control Systems Technology*.
6. **Amor A. Menezes**, Ryan F. Vilardi, Adam P. Arkin, and Mitchell J. Cohen. Targeted clinical control of trauma patient coagulation through a thrombin dynamics model. Expected submission to the *Proceedings of the National Academy of Sciences*.

Conference Papers

Total: 15

1. **Amor A. Menezes** and Ilya V. Kolmanovsky. Energy and power management in a series hybrid electric vehicle using selective evolutionary generation. In *Proceedings of the 53rd IEEE Conference on Decision and Control*, December 15–17, 2014.
2. Dhaval D. Shah, **Amor A. Menezes**, and Ilya V. Kolmanovsky. Glider flight environment modeling for optimal control. In *Proceedings of the 2012 American Control Conference*, pages 926–931, June 27–29, 2012.
3. †Yongsoon Eun, Eric Gross, Pierre Kabamba, Semyon Meerkov, **Amor Menezes**, and Hamid Ossareh. Cyclic control: The case of static output feedback. In *Proceedings of the 18th IFAC World Congress*, pages 9181–9187, August 28–September 2, 2011. doi:10.3182/20110828-6-IT-1002.00784.
4. **Amor A. Menezes** and Pierre T. Kabamba. Efficient and responsive stochastic optimization. In *Proceedings of the 18th IFAC World Congress*, pages 4735–4740, August 28–September 2, 2011. doi:10.3182/20110828-6-IT-1002.02531.
5. Chris Vermillion, **Amor Menezes**, and Ilya Kolmanovsky. Stable hierarchical model predictive control using an inner loop reference model. In *Proceedings of the 18th IFAC World Congress*, pages 9278–9283, August 28–September 2, 2011. doi:10.3182/20110828-6-IT-1002.02733.
6. Ilya V. Kolmanovsky and **Amor A. Menezes**. A stochastic drift counteraction optimal control approach to glider flight management. In *Proceedings of the 2011 American Control Conference*, pages 1009–1014, June 29–July 1, 2011.
7. **Amor A. Menezes** and Pierre T. Kabamba. Selective evolutionary generation: A model for optimally efficient search in biology. In *Proceedings of the 2011 American Control Conference*, pages 4117–4122, June 29–July 1, 2011.
8. **Amor A. Menezes** and Pierre T. Kabamba. Rational behavior design using multi-selective generation. In *Proceedings of the 49th IEEE Conference on Decision and Control*, pages 3938–3943, December 15–17, 2010.
9. ‡ShiNung Ching, Yongsoon Eun, Eric Gross, Eric Hamby, Pierre Kabamba, Semyon Meerkov, and **Amor Menezes**. Modeling and control of cyclic systems in xerography. In *Proceedings of the 2010 American Control Conference*, pages 4283–4288, June 30–July 2, 2010.
10. **Amor A. Menezes** and Pierre T. Kabamba. Resilient self-reproducing systems. In *Proceedings of the 2008 ASME Dynamic Systems and Control Conference*, number DSCC2008-2284, October 20–22, 2008.
11. **Amor A. Menezes** and Pierre T. Kabamba. Optimal seeding of a class of self-reproducing systems. In *Proceedings of the AIAA Guidance, Navigation and Control Conference and Exhibit*, number AIAA-2008-7272, August 18–21, 2008.
12. **Amor Menezes** and Pierre Kabamba. An optimal-seed identification algorithm for self-reproducing systems. In *Proceedings of the 58th International Astronautical Congress*, number IAC-07-D3.2.02, September 24–28, 2007.

13. **Amor Menezes** and Pierre Kabamba. A combined seed-identification and generation analysis algorithm for self-reproducing systems. In *Proceedings of the 2007 American Control Conference*, pages 2582–2587, July 11–13, 2007.
14. **Amor Menezes** and Pierre Kabamba. Information requirements for self-reproducing systems in lunar robotic colonies. In *Proceedings of the 57th International Astronautical Congress*, number IAC-06-A5.P.04, October 2–6, 2006.
15. **Amor Menezes**, Rowena Luk, Paul T. Y. Lam, and Ziad Bhunnoo. Applying Martian rover technology to solve terrestrial problems — the development of an Autonomous Cold-Trailing Omnirange Robot (ACTOR). In *Proceedings of the 56th International Astronautical Congress*, number IAC-05-E2.3.03, October 17–21, 2005.

‡ denotes an alphabetical author listing

Conference Abstracts

Total: 4

1. **Amor A. Menezes** and Pierre T. Kabamba. Efficient search and responsiveness trade-offs in a Markov chain model of evolution in dynamic environments. In *Proceedings of the Gordon Research Conference on Stochastic Physics in Biology*, January 11–16, 2015.
2. **Amor A. Menezes**, John Cumbers, John A. Hogan, and Adam P. Arkin. *In situ* resource utilization on manned Martian missions. In *Proceedings of the 2014 Synthetic Biology: Engineering, Evolution & Design Conference*, July 14–17, 2014. **Selected for oral presentation.**
3. **Amor Menezes**, Adam Arkin, and Mitchell Cohen. Modeling coagulation activation in trauma patients. In *Proceedings of the 11th International Conference on Complexity in Acute Illness, Journal of Critical Care*, volume 28, pages e10–e11, September 6–9, 2012. **Selected for oral presentation.**
4. **Amor A. Menezes**, Adam P. Arkin, and Mitchell J. Cohen. A minimal coagulation activation model for thrombin in trauma patients. In *Proceedings of the 13th International Conference on Systems Biology*, page 110, August 19–23, 2012.

Theses

Total: 1

1. **Amor A. Menezes**. *Selective Evolutionary Generation Systems: Theory and Applications*. PhD thesis, University of Michigan, 2010.

NON-REFEREED PUBLICATIONS

Journal Editorials

Total: 1

1. **Amor A. Menezes** and Pierre T. Kabamba. Realizing the promise of robotic self-x systems. *Robotica*, 29(1):i–ii, January 2011.

Book Chapters

Total: 1

1. **Amor A. Menezes** and Pierre T. Kabamba. Markov chain rational behavior. In Jingshan Li and Pierre T. Kabamba, editors, *Advances in Systems Theory: Control, Communication Networks, Production Systems and Rational Behavior*. Wing Span Press, 2009.

Technical Reports

Total: 3

1. Chris Vermillion, **Amor Menezes**, and Ilya Kolmanovsky. Stable hierarchical model predictive control using an inner loop reference model and λ -contractive terminal constraint sets – supplementary material. Technical Report CGR-13-01, University of Michigan, Ann Arbor, 2013. arXiv:1305.2651 [math.OC].
 2. **Amor Menezes** and Pierre Kabamba. Resilient opportunistic on-line global optimization. Technical Report CGR-09-11, University of Michigan, Ann Arbor, 2009.
 3. **Amor Menezes** and Pierre Kabamba. On the seeding of self-reproducing systems. Technical Report CGR-07-08, University of Michigan, Ann Arbor, 2007.
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REFERENCES (ALPHABETICAL)

Total: 5

Adam P. Arkin

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Dean A. Richard Newton Memorial Professor
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Postdoctoral Advisor

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(734) 615-9655
ilya@umich.edu

Sadly, my Ph.D. advisor Professor Pierre T. Kabamba
passed away September 20, 2014
